HYCONTROL
LEVEL MEASUREMENT SOLUTIONS

User Manual

SONARFLEX

Sonar System

Sludge and Settling Level Interface Monitoring

For more information, please visit >
www.hycontrol.com

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Principle of Operation

The Sonarflex transducer emits a high powered low frequency sonar pulse, which is reflected from the interface density selected. The reflected signal is processed using specially developed software algorithms that eliminate unwanted densities and stratified layers, allowing measurement of Bed or RAS levels. It can be calibrated to measure lighter densities such as the hindered / free settling layer & floc or one of the outputs could be used for a "Clarity" output, similar to a basic turbidity transmitter measuring solids in suspension. The unit can include two outputs to measure two different interfaces simultaneously.

Function

The Hycontrol Sonarflex, sludge blanket and interface controller, consists of a microprocessor based transmitter, with easy menu driven programming via keypad, PC or 3G modem. The Sonarflex controller works together with appropriate sonar transducer and transducer cleaning mechanism.

Benefits

- Improved efficiency and control of the thickener process
- Fully automated plant systems with reliable interface level monitoring
- Advanced warning of process upset or hydraulic in-balance
- Reduced maintenance with automatic cleaning mechanism warranty (no blades to replace)
- Reduced site operational costs significantly with improved process & extraction control
- Improved health and safety on site (no manual dips required).

Features

- Dual independent analogue outputs to track two different interfaces, or clarity simultaneously, with the one sonar sensor
- Easy to use pre-set calibrations to track specific density interfaces, eg: floc / fluff layer, Bed
- Industrial scum cleaning mechanisms that do not require maintenance
- Control room graphics of tanks and interfaces via Vision System II software
- Wide range of communications: Modbus, HART, Foundation Fieldbus, DeviceNet, Profibus DP and Profibus PA
- 3G remote support capability for calibration, commissioning or technical back-up
- 3 programmable relays

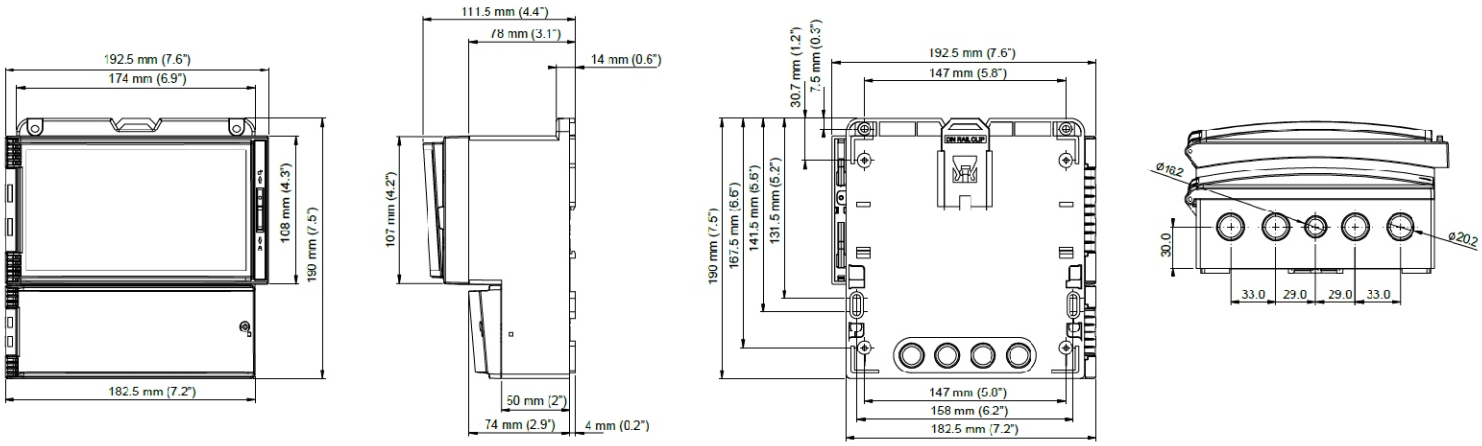
Auto Scum Cleaner

SONARFLEXSCA Pictured with Mounting Pole

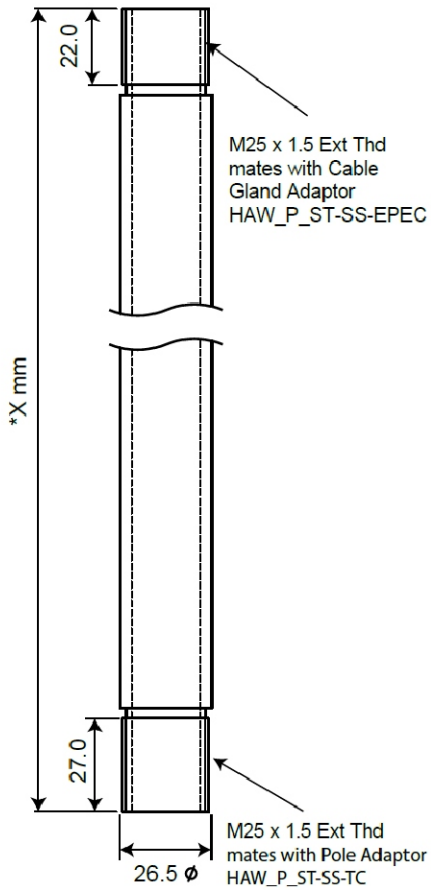
Sonarflex Amplifier

Sonarflex Transducer

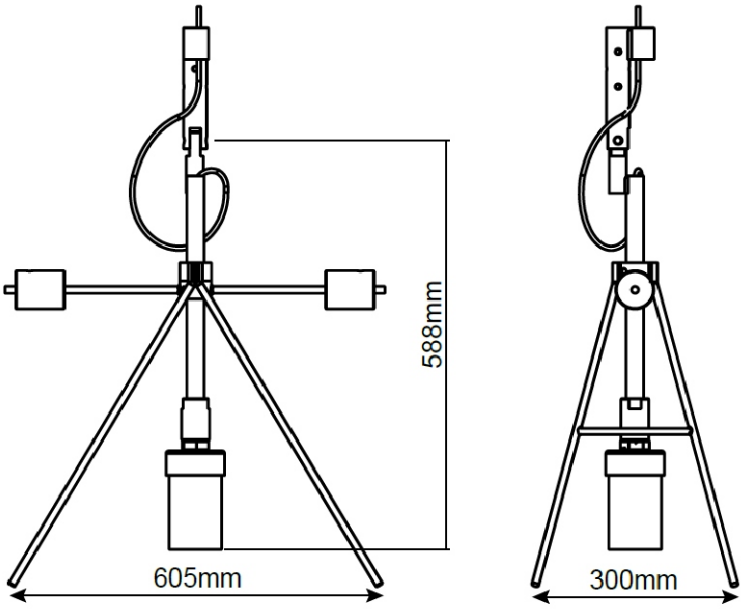
Sonarflex Remote Amplifier



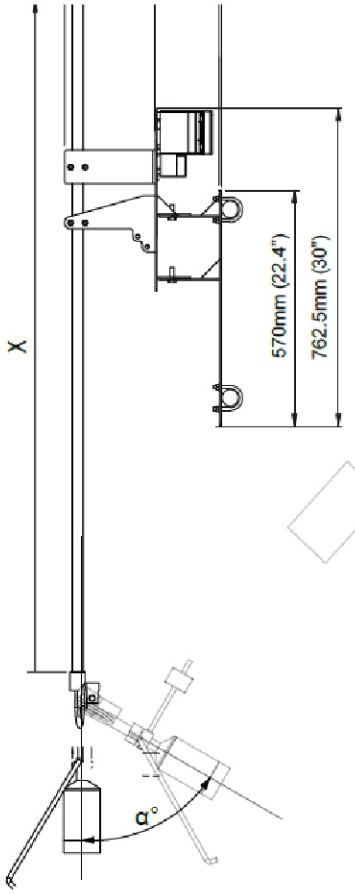
SONARFLEXMELx* - Mounting Pole



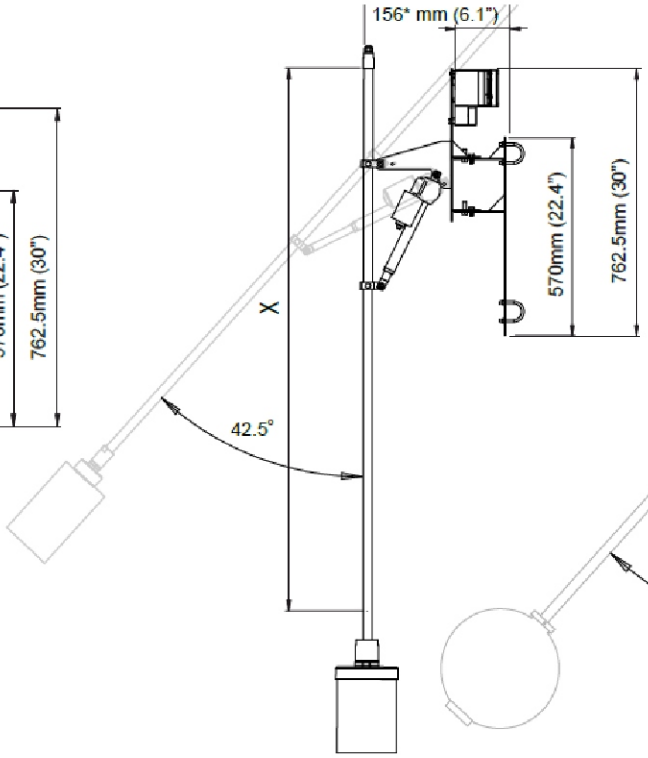
SONARFLEXSCE - Impact Plate



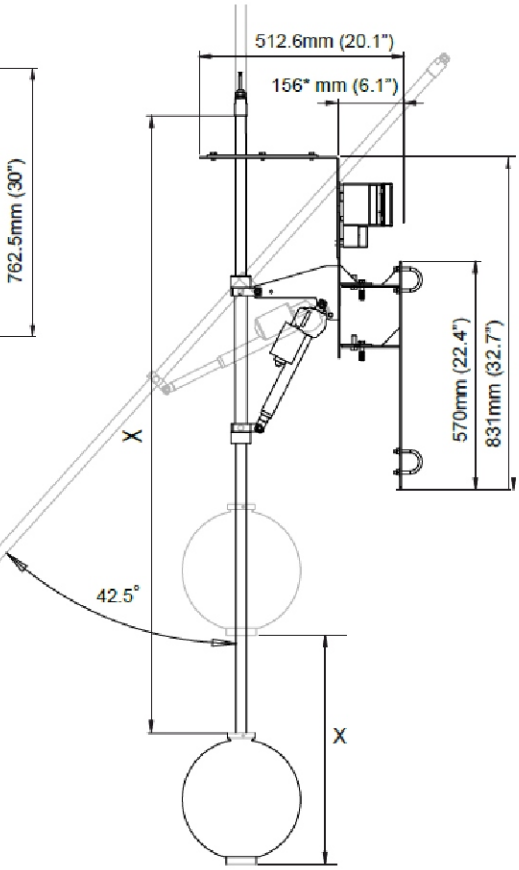
SONARFLEXSCE Impact Plate



SONARFLEXSCA Actuator

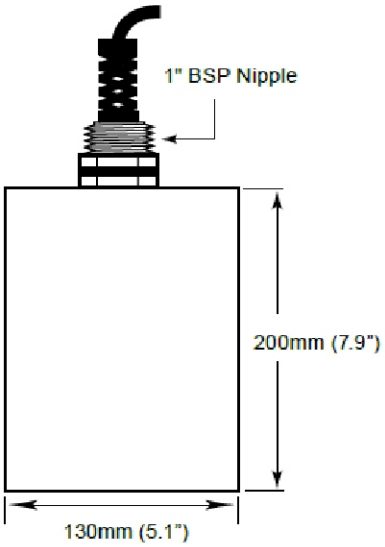


SONARFLEXSCD Floating Sonar

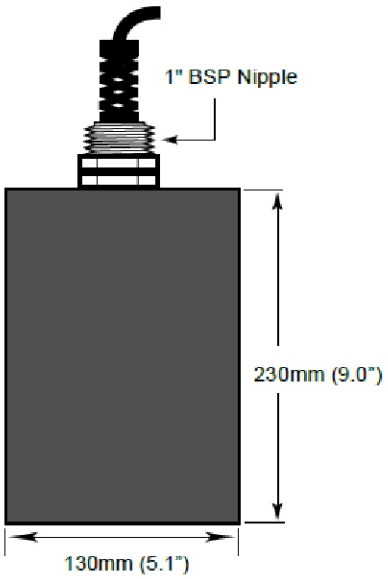


X = Decent Range
Distance from safety
rail or Bridge may vary

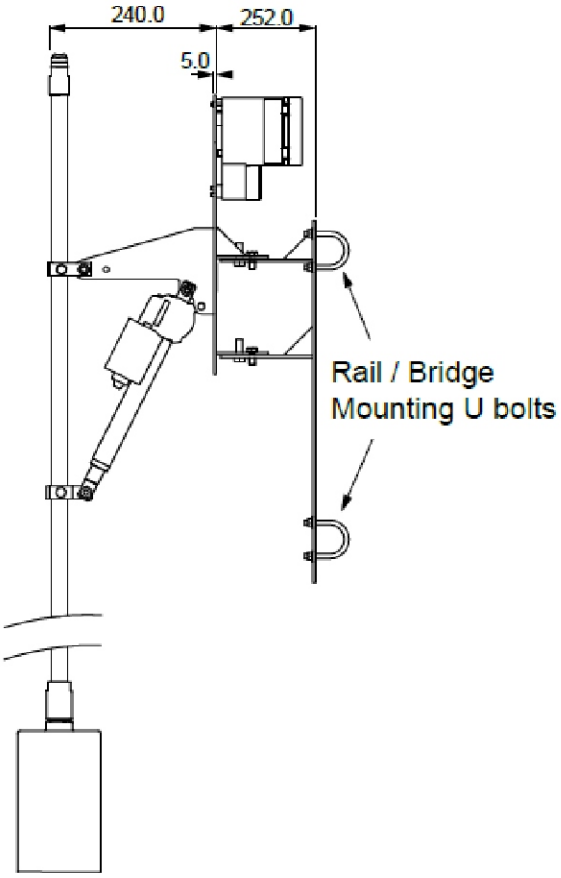
SONARFLEXT302S4 Transducer

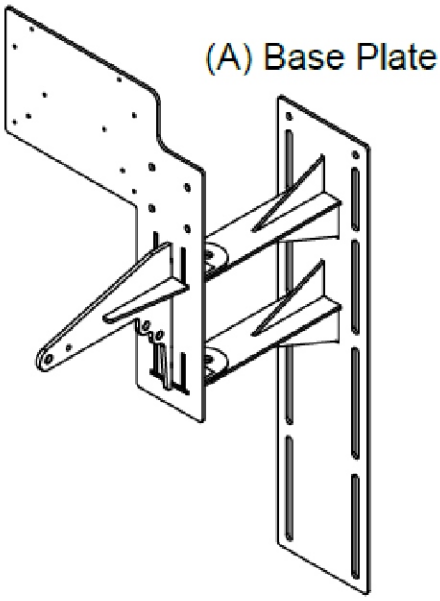


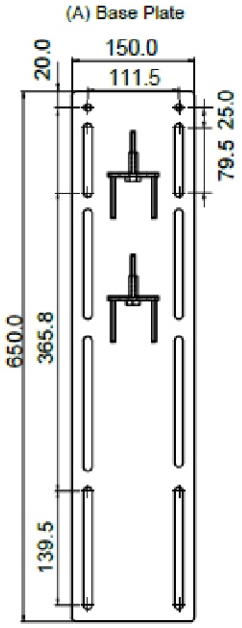
SONARFLEXT302SH Transducer

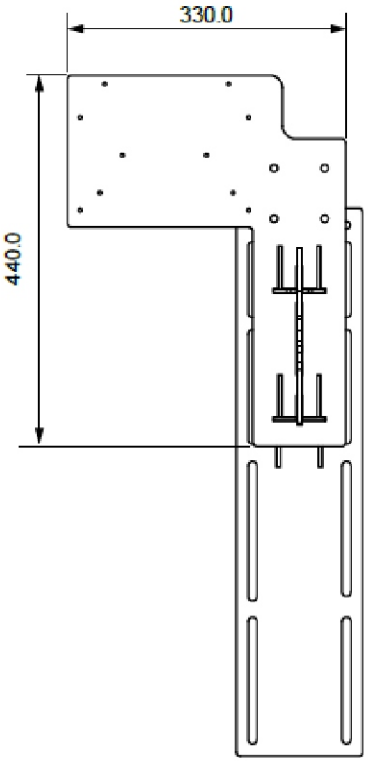


Mounting Bracket



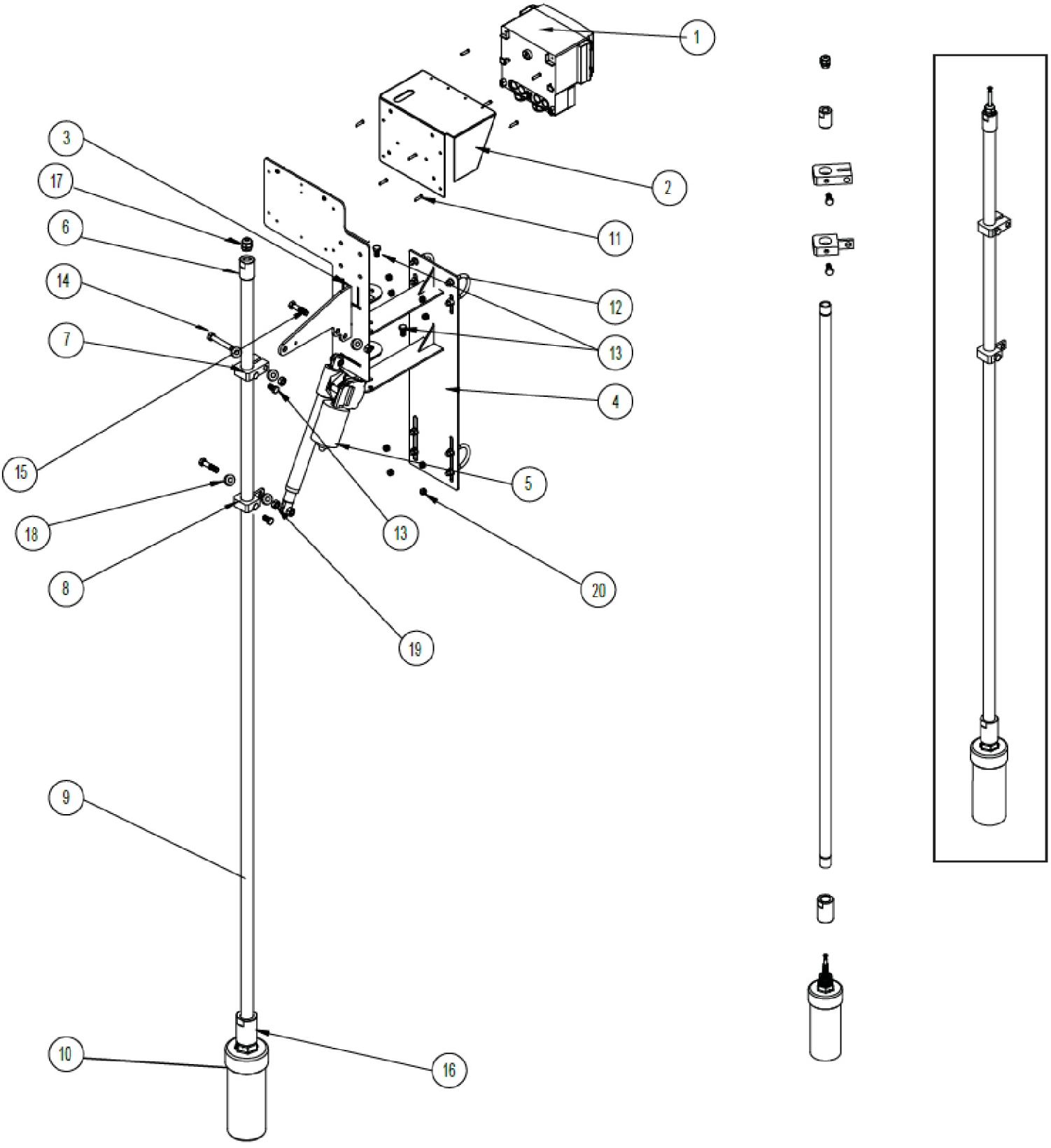




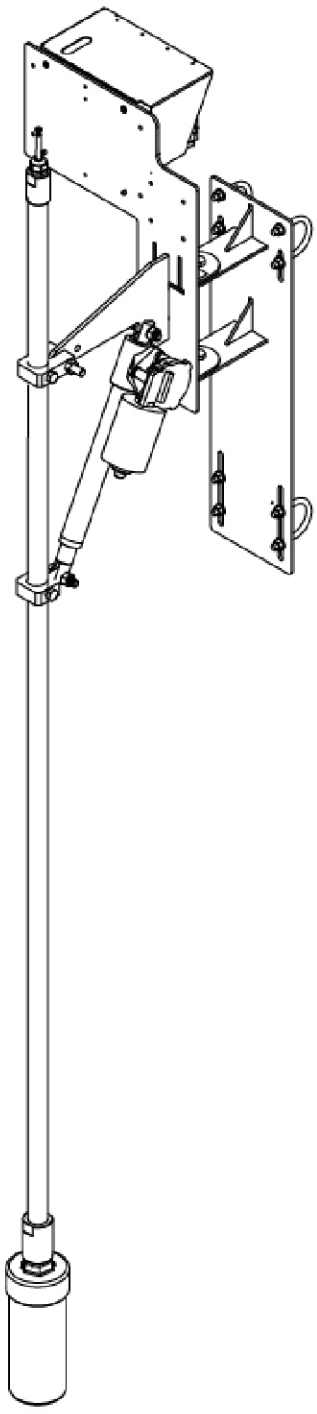


Mounting Bracket / Pole assembley

SONARFLEXSCA Pictured



Mounting Bracket / Pole assembley

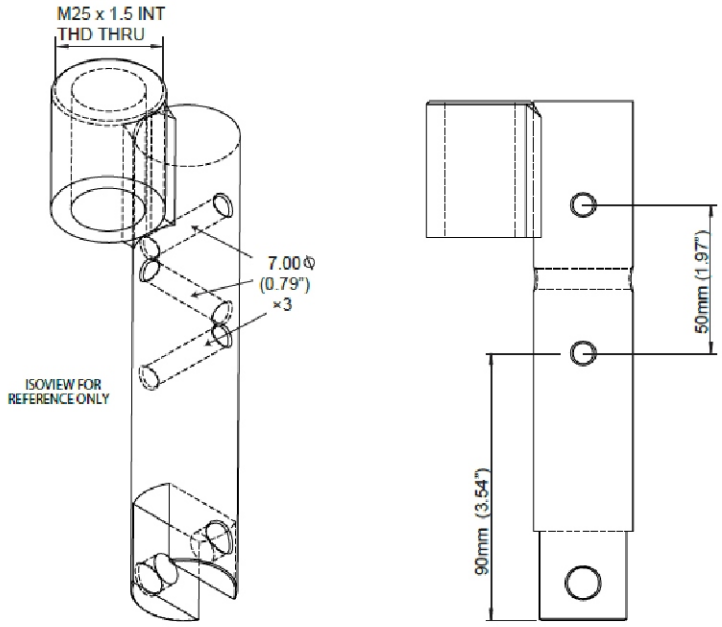


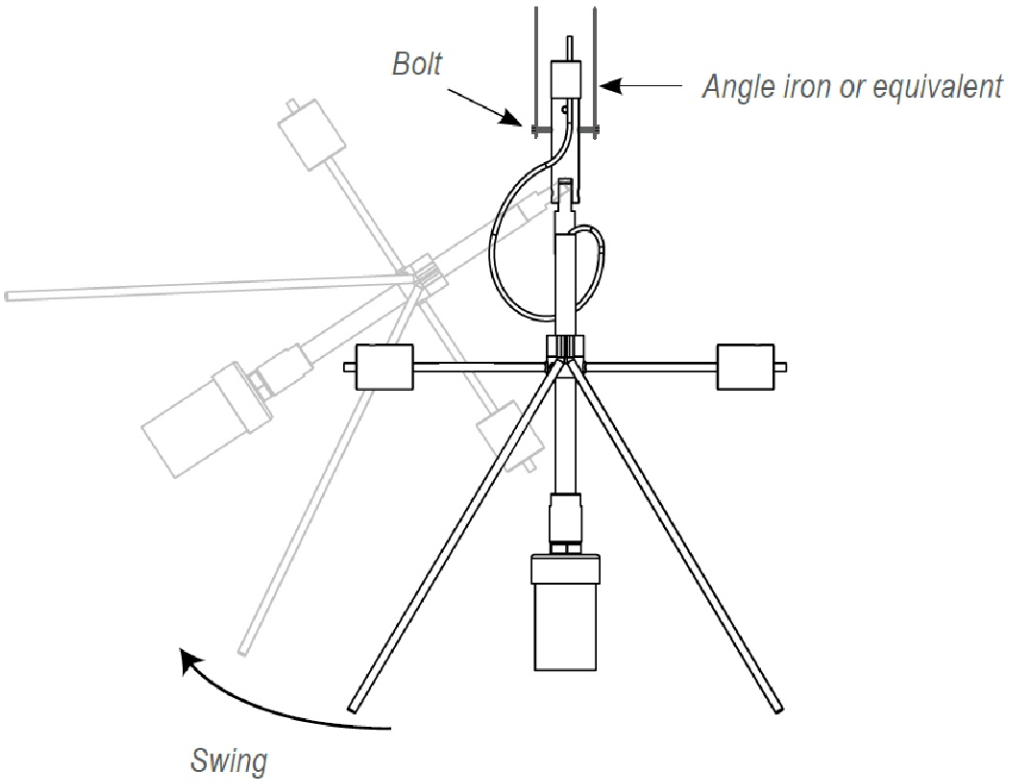
Item No.	Part Number	Description	Qty
1	OSIRxxx	ORCA Transmitter	1
2	SUNHOOD	Stainless Steel Sunhood	1
3	SA-SS-AAFB	Stainless Steel Front Bracket	1
4	SA-SS-AARB	Stainless Steel Rear Bracket	1
5	LAUS061196E Actuator	Actuator (only with OSIRSCA/OSIRSCD)	1
6	ST-SS-EPEC	Pole to Cable Gland Adaptor with M16 cable gland	1
7	ST-APC-26.8-INT	SS Internal Pipe Clamp	1
8	ST-APC-26.8-EXT	SS External Pipe Clamp	1
9	ST-SS-EP	Mounting Pole	1
10	OSIRTxxxxxxxx	Sonar Transducer	1
11	ZPP-M5X20MM	M5x20 Phillips Pan Head	8
12	U-BOLT 50mm x 8DIA	U-Bolt with nuts and washers	4
13	BOL-M10x15SS	M10 x 15mm SS Bolt	4
14	BOL-M10x50SS	M10 x 50mm SS Bolt with washer & nyloc nut	1
15	BOL-M10x40SS	M10 x 40mm SS Bolt with washer & nyloc nut	2
16	ST-SS-TC	Sonar Pole Adaptor	1
17	GLA-M16	M16 Cable gland IP68 with washer	1
18	Washer-M10	M10 washer for M10x40mm & M10x50mm SS Bolt	6
19	Nut-M10	M10 nut for M10x40mm & M10x50mm SS Bolt	5
20	Nut-M8	M8 nyloc nut for 50mm U-bolt	8

Impact Plate Mounting Connection

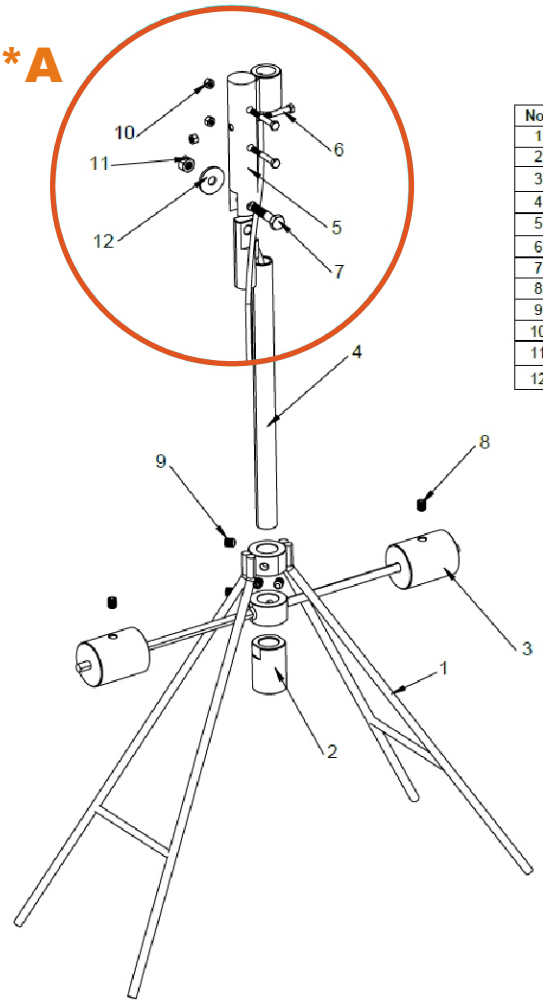
The top of the Impact Plate has 3 x 7mm bolt holes which can be secured to an angle iron or equivalent bracket. There is also a M25 (1.5”) threaded connection for a mounting pole connection. The Impact Plate is designed to swing parallel with the counter weights. The surface sweeper must come in contact with the legs of the Impact Plate which swings the bracket lifting the transducer out of the liquid. When the sweeper has cleared, it will drop back in and use the counter weights to re center. The force of the movement will clear the sensor face of any build up.

Impact Plate Connection Point



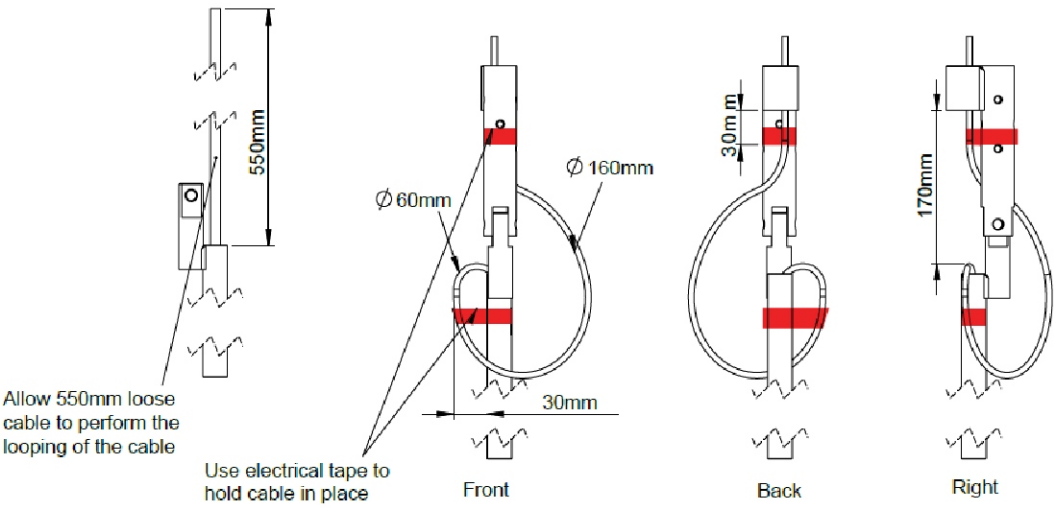


Impact Plate Assembly



No.	Description	QTY.
1	Impact Plate Dual Direction	1
2	Sonar Pole Adaptor	1
3	Impact Plate Counter Balance	1
4	Sonar Male Clevis Assembly	1
5	Sonar Female Clevis Assembly	1
6	M6×45 Stainless Steel Bolt	3
7	M10×40 Stainless Steel Bolt	1
8	M10×12 Stainless Steel Set Screw	4
9	M10×20 Stainless Steel Set Screw	2
10	M6 Stainless Steel Nut	3
11	M10 Stainless Steel Nyloc Nut	1
12	M10 Stainless Steel Washer	1

*A: Important Cabling Steps to Follow



Installation Guide

SONARFLEX Transmitter – Mounting Requirements

Select a suitable mounting position, preferably not in direct sunlight. If necessary utilize a sunshade.
Observe the maximum and minimum temperature Specification.
Do not mount the sonar transmitter near high sources of EMF, such as motor starters, variable speed drives or 3 phase cables. Avoid mounting in high vibration areas, or use rubber absorption mounts.
Be careful when removing the cable and compression glands.

Round Tanks – Centre Feedwell

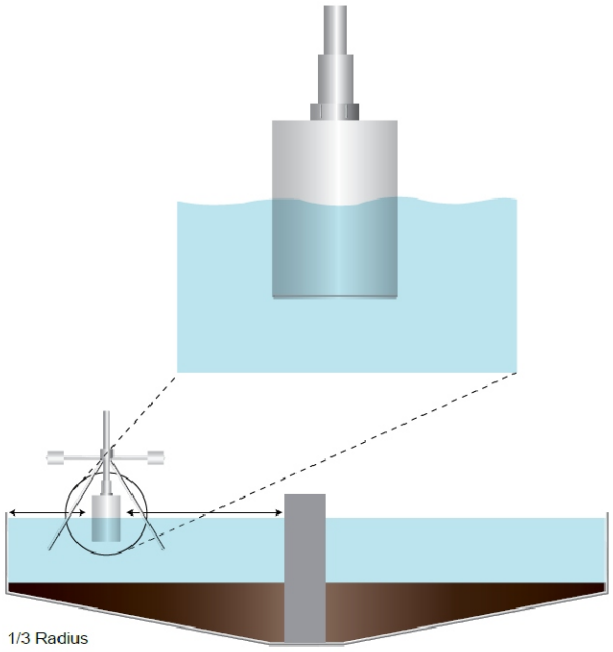
Mount the sonar transducer and cleaning mechanism, approximately one third radius between the outside tank wall and the feedwell. This is the same whether it is a moving or fixed bridge installation.
Do not mount near high infeed turbulence.
Choose a site installation where the infeed is least disturbed.

Rectangular Tanks – End Feed

Mount the sonar transducer and cleaning mechanism away from high infeed turbulence. A clearance of 700mm from the side wall.
Do not mount directly over scraper, chain mechanisms. Choose a site installation where the infeed is least disturbed.

Sonar Transducer – Mounting Requirements

The transducer should be half submerged in the liquid and the transducer face must always be submerged.
Wrap cable entry and lower connection cable with Teflon tape.



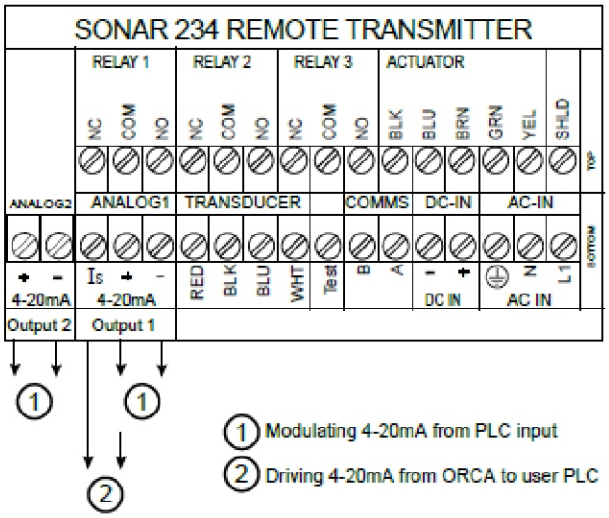
Rectangular Tanks – End Feed

Mount the floating sonar transducer and cleaning mechanism as close as practicable to the launders. Mount at least 1.00 metres from side walls. Ensure alignment guides are installed on the mounting bracket for decanter ranges above 500mm.

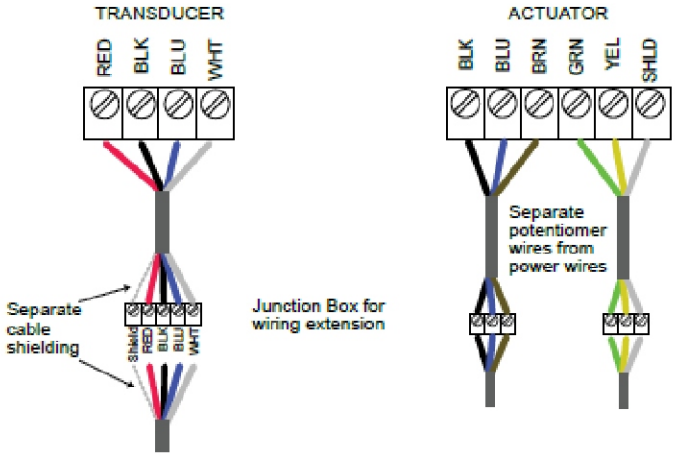
Rectangular Tanks – End Feed

Mount the floating sonar transducer and cleaning mechanism as close as practicable to the launders. Mount at least 1.00 metres from side walls. Ensure alignment guides are installed on the mounting bracket for decanter ranges above 500mm.

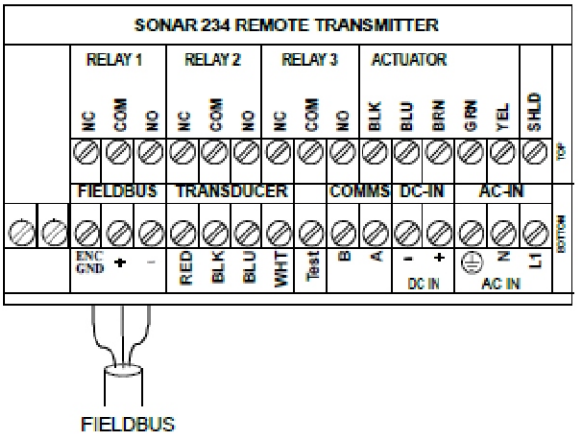
Wiring - Remote Transmitter



Wiring Extension

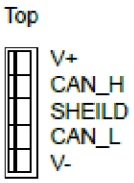


Foundation Fieldbus

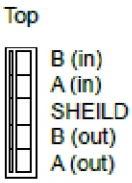


DeviceNet / Profibus DP

Terminal plug located right hand side of main terminal board.

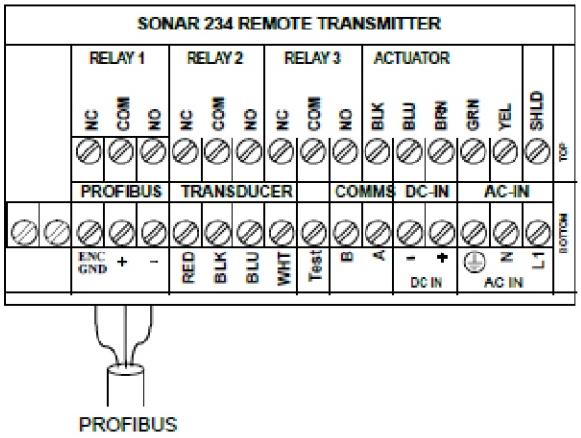


DeviceNet



Profibus DP

Profibus PA



Actuator Cable Specification

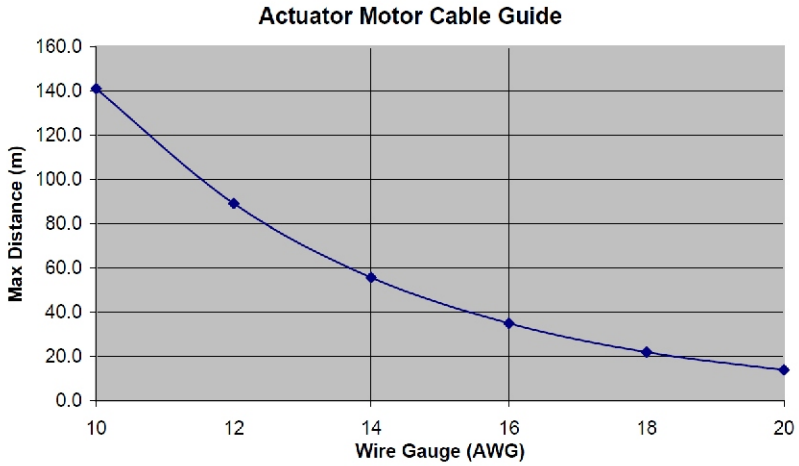
Note 1: Calculations based on:
4.0 Amps max actuator current and;
4.0 Volts drop across max cable length (2 wires)

Note 2: Note 2: Maximum terminal capacity is 1.5mm, which limits 16AWG cable to35m.

Note 3: For long cable runs, use 16 AWG to local junction box, then extend using 10-14 AWG.

Note 4: Also required: 3-wire cable for feedback potentiometer, 0.5mm - 1.0mm.

Gauge AWG	Nom OD mm	Resist Ohm/1000ft	Resist Ohm/m	Loss V/m	Max Res Ohm	Max Dist m
10	2.9201	0.8	0.0035	0.028	1	141.1
12	2.4401	0.71	0.0056	0.045	1	89.1
14	1.9302	0.73	0.009	0.072	1	55.8
16	1.5204	0.35	0.0143	0.114	1	35
18	1.2206	0.92	0.0227	0.182	1	22
20	0.965	0.9	0.0358	0.286	1	14



Profibus PA

See dedicated manual for Profibus PA available from http://www.hycontrol.com

DeviceNet

Set the BaudRate and the DeviceNet Address in Sultan

Factory defaults of baudrate and FBusAdds are 125kbps and 63 in a Sonarflex unit with DeviceNet CommType. To modify these values follow the instructions below.

1. Go to the Output Adjustment menu
2. Use the Up and Down push buttons to reach the CommType parameter
3. Make sure that the CommType is set to DeviceNet
4. Press the CAL button twice. If you see DeviceID do not modify this parameter.
5. Use the Down push button to reach the BaudRate Parameter
6. The default value for the BaudRate is 125kpbs. Press CAL button and use the Up and Down push buttons to modify this value
7. Press CAL button when finished
8. Use the Down push button to reach the FBusAdds. The default value of the Fieldbus Address is 63. Press CAL button and use the Up and Down push buttons to modify this value
9. Press CAL button again when finished

Output Data

Profibus DP and DeviceNet now transmit 18 bytes/9 words, description of the words is as follows (For firmware version 5.54 and above)

1. Displayed Distance (Space Distance is the Primary Variable)
2. Percentage (Percent of Range)
3. Hi Level (Upper Range)
4. Low Level (Lower Range)
5. Status Flags
6. Displayed Distance2 (Second Variable)
7. Percentage2 (Second Percent of Range)
8. Displayed Distance3 (Third Variable)+
9. Percentage3 (Third Percent of Range)+

Failed	~~~~~~	Search	0	Echo Cfm : 1 = True, 0 = False	Echo R : 1 = True, 0 = False
Bit F	Bit E	Bit 3		Bit 1	Bit 0

Bit0 = Echo was received inside the span.

Bit1 = Echo is Confirmed.

Bit3 = Searching is searching for an Echo.

BitF = Unit has Failed to detect an Echo.

+Only used for HYCONTROL Sonar Clarity output.

Profibus DP

Set the Profibus Address in Sonarflex
Factory defaults of FBusAdds is 126 in a Sonarflex unit with Profibus CommType. To modify this value follow the instruction below:

1. Go to the Output Adjustment menu
2. Use the Up and Down push buttons to reach the CommType parameter
3. Make sure that the CommType is set to Profibus DP
5. Press the CAL button twice - If you see DeviceID do not modify this parameter
6. Use the Down push button to reach the BaudRate parameter. Note this cannot be modified
7. Use the Down push button to reach the FBusAdds. The default value of the Fieldbus Address is 126. Press CAL button and use the Up and Down push buttons to modify this value
8. Press CAL button again when finished

Output Data

Profibus/DeviceNet now transmit 18 bytes/9 words, description of the words is as follows (For firmware version 5.54 and above).

1. Displayed Distance
   (Space Distance is the Primary Variable)
2. Percentage (Percent of Range)
3. Hi Level (Upper Range)
4. Low Level (Lower Range)
5. Status Flags
6. Displayed Distance2 (Second Variable)
7. Percentage2 (Second Percent of Range)
8. Displayed Distance3 (Third Variable)+
9. Percentage3 (Third Percent of Range)+

Failed	~~~~~~	Search	0	Echo Cfm : 1 = True, 0 = False	Echo R : 1 = True, 0 = False

Bit F Bit E Bit 3 Bit 1 Bit 0

Bit0 = Echo was received inside the span.

Bit1 = Echo is Confirmed.

Bit3 = Searching is searching for an Echo.

BitF = Unit has Failed to detect an Echo.

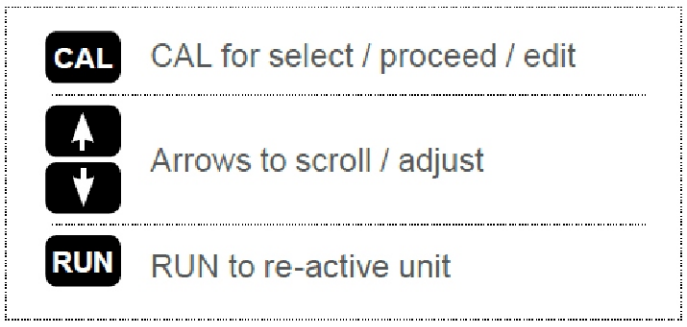
+Only used for HYCONTROL Sonar Clarity output.

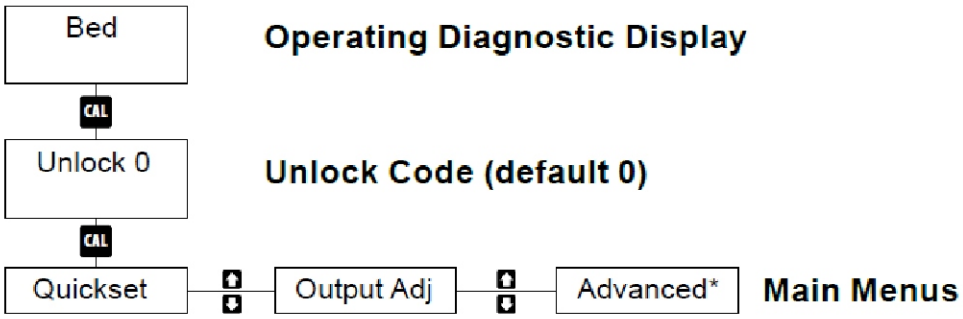
Powering The Unit

When power is applied the unit will start up automatically. It will scroll through its boot diagnostics and display the serial numbers, software version and model types for the amplifier and transducer.

The unit will display its default operating screen depending on the App Type selected (default: Bed) on the top line and a distance or % on the bottom line. The distance will be the programmed display mode (Default: Level).

The unit will re-scan for the measurement whenever it is powered up.
The sensor face must be submerged in liquid in order to operate correctly.





Amplifier / Application settings

Comms / Output Settings

Transducer settings.

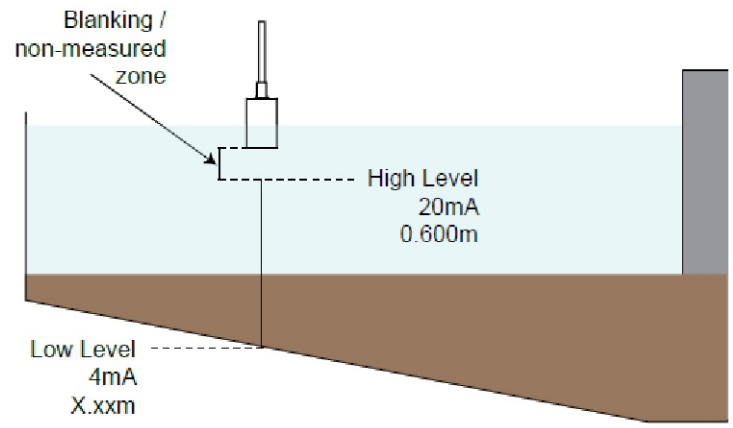
**Do not adjust Advanced settings without expert knowledge*

Quickset

The Quickset menu contains the basic parameters required to get the unit up and running.
It is one of the three main menu options in the internal software.

Parameter	Description	Options			
Unit	Adjust displayed measurement unit	Inches	Feet	Meters	Centimeters
App Type	Select Application Parameters for Output 1	See Unit Setup: 'App Type'			
App Type2	Select Application Parameters for Output 2	See Unit Setup: 'App Type2'			
Failsafe	Set failsafe output & timer	20mA 4mA LastKnown 3.80mA 3.50mA 20.20mA			
DispMode	Set LCD measurement display mode	Level	Level%	Space	
Offset	Add offset distance to output	Adjustable			
Amp Reset	Restore Amplifier settings to factory default	Yes / No			

Rectangular Tanks – End Feed



Typical installation - Set 'Low Level' (4mA) to be the distance from the transducer face to the bottom of the tank. High Level should be 0.600m for most accurate and reliable measurement.

App Type

App Type is the first output and should be considered the primary measurement. If monitoring Bed level this should be selected here. App Type has three pre-set application types.

- Bed (dense/heavy blanket layer).
- RAS (return activated sludge)
- Floc (Flocculent/hindered settling layer).

Parameter	Description	Options			
App Type	Set display readout	Bed	RAS	Floc	
Density	Select interface to be measured	See **Interface Table** below			
Calibrat	• Manually fine tune sensor sensitivity • Press CAL to fire a test pulse which will return the depth measurement.	Higher value for lighter densities, lower value for heavier densities.			
Lo Level	Set Lo Level measurement point (4mA)	Adjustable			
Hi Level	Set Lo Level measurement point (20mA)	Adjustable			
Bed Depth[(1)]	Set maximum expected Bed Depth - see Bed Depth[(1)] for further information	Adjustable in depth (measured from Sensor face down)			
Fill Rate*	Set potential filling rate for primary measurement	Adjustable (units per hour)			
Empty Rate*	Set potential emptying rate for primary measurement	Adjustable (units per hour)			

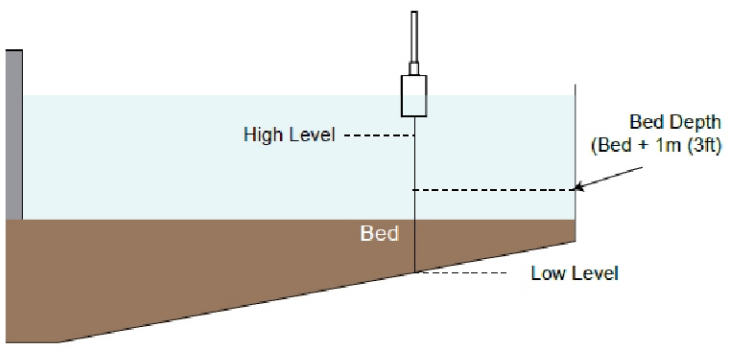
*For most applications the unit is pre-calibrated with appropriate tracking speeds. You will not need to adjust these settings.

Wiring - Remote Transmitter

Density Selected (g/l)	Typical Applications	
0.1 - 0.6	Lighter layers	
0.6 - 1.2	Hindered Layer	Settling Layer
1.2 - 3.0	RAS	
3.0 - 6.0	RAS	Bed
6.0 -1 0.0	Bed	
10+	Bed / Heavy Sludge	

Wiring Extension

Bed Depth should be programmed to 1m (3ft) higher than the application expected maximum depth



App Type2

App Type is the second output and should be considered the secondary measurement. This output is sampled and updated at programmed intervals

- Bed (dense/heavy blanket layer).
- RAS (return activated sludge)
- Floc (Flocculent/hindered settling layer)
- Clarity (indication of signal lost due to liquid conditions, 0% poor conditions, 100% clean conditions)

Parameter	Description	Options				
App Type2	Set display readout for secondary measurement	Off	Bed	Ras	Floc	Clarity**
Density	Select interface to be measured	See **Interface Table** below				
Calibrat	• Manually fine tune sensor sensitivity • Press CAL to fire a test pulse which will return the depth measurement.	Higher value for lighter densities, lower value for heavier densities.				
Lo Level2	Set Lo Level measurement point (4mA)	Adjustable				
Hi Level2	Set Lo Level measurement point (20mA)	Adjustable				
SmplRate	Set the time between measurement samples taken for the App Type2	Adjustable (minutes)				
Damping2	Adjust 2nd output response time / smoothness	Value in pulses, approximately 2 pulse per second				

** See 'Clarity' for important information

Interface Table

Density Selected (g/l)	Typical Applications	
0.1 - 0.6	Lighter layers	
0.6 - 1.2	Hindered Layer	Settling Layer
1.2 - 3.0	RAS	
3.0 - 6.0	RAS	Bed
6.0 - 10.0	Bed	
10+	Bed / Heavy Sludge	

Clarity

Clarity is a representation of how clear the liquid is between the interface measured by App Type (output 1) and the transducer face.

The unit monitors the number and quality of return echoes and uses an algorithm to convert this to a percentage. The percentage is a rolling average of approximately 5 minutes of measurement.

Output Adjustment

The Output Adj menu contains parameters related to adjusting analogue, switch & communication protocol relayed settings.

Parameter	Description	Options	
FillDamp EmtyDamp	Adjust first output response time / smoothness	Value in pulses, approximately 2 pulse per second	
4mA Adj	Fine tune the 4mA output current	Adjustable	
20mA Adj	Fine tune the 20mA output current	Adjustable	
Analog	Invert analogue from 4-20mA to 20-4mA	4-20mA	20-4mA
Simulate	A simulated distance reading is transmitted as analogue (distance measured from sensor face)	Adjustable	
4mA Adj2	Fine tune the 4mA output2 current	Adjustable	
20mA Adj2	Fine tune the 20mA output2 current	Adjustable	
Comm Type	• Adjust communication protocol settings • Analogue and Switch models include Modbus as standard	See 'Comms Type' section	
RlyMod 1-3	Configure Relay actions	See 'Relay Actions' section	
Cleaning	Set auto cleaner parameters	See 'Cleaning' section	
Bk Light	Turn on/off LCD backlight	On/Off	
DispChar	Switch display from 12 character to 8 character (older units)	12 digit / 8 digit	
V In Chk	When active the unit will switch to failsafe mode if input voltage drops below required power. When not active unit will display 'Input Voltage too low' on the display.	On / Off	

Comms Type (Menu)

Sub-Menu	Description	Options
DeviceID	Adjust unit device ID for Modbus, HART, Profibus DP	1-255
FBusAdd	Adjust unit Device ID for FF/PA, DeviceNet	1-255
BaudRate	Adjust comms network speed	Comms dependant

HART

Command Number 3
Current and dynamic variables

Description	Byte No.
Current (mA)	0-3
PV1 Unit (App Type1)	4
PV1 Measurement (App Type 1)	5-8
SV unit (App Type 2)	9
SV measurement (App Type 2)	10-13

Modbus

Protocol: Modbus RTU (2 wire)
Speed: 19200 Baud
Data bits: 8
Parity: None
Stop Bits: 1

Hycontrol Sonarflex units act as 'slave' devices on a Modbus network. Units are shipped from the factory with a default Modbus address of 1. The Modbus address of any unit can be changed individually if units are to be connected in a multi-drop network. Each address number must only be used once on any network (possible addresses are 1-255).

Primary Measurement Modbus Registers

Description	Options
App Type (Output 1) measured distance (from sensor face to measured level), mm	40125
App Type2 (Output 2) measured distance (from sensor face to measured level), mm	40118
Clarity (%)	40117

Note: Comms option 'X' and 'Y' includes Modbus as standard.

Cleaning

Sub-Menu	Description	Options
Intvl	Keeps the actuator swing extended for the selected time interval before retracting to normal position	6 minutes 3 minutes 1 minutes
Spry	Uses Relay 3 to activate an external system (such as a spray cleaner) for the selected time. The actuator swing will be at full extension for this selected time.	90 seconds 60 seconds 30 seconds
Solenoid	Uses Relay 3 to drive an external solenoid (used for pneumatic actuator control)	Selectable
Brush	Uses Relay 3 to drive an external solenoid (used for wiper brush control)	Selectable
Actuator	Selects Actuator auto cleaning function (default cleaning option). Actuator will extend and retract based on programmed timer.	See 'Actuator'
Off	Disables Cleaner function	Selectable
Actua In	Manually trigger Actuator to 'in' (home) position*	Selectable
Actua Out	Manually trigger Actuator to 'out' (extended) position*	Selectable

Actuator

Sub-Menu	Description	Options
Act Max Act Min	Adjust the default swing position (Max) and Home position (Min	Adjuatable (mm)
Cycle	Set timer in minutes between Actuator swings	Adjustable
VoltCutOff	Set minimum voltage present before Actuator action is cancelled and error message ActuatorErr or ActuatorVsErr is displayed on screen	Default 14V

*If testing with these parameters you must follow this sequence for the Actuator to function correctly

- Select 'Actua Out'
- Select 'Actua In'
- Select 'Actuator'

The Actuator must be returned to 'In' mode before activating the auto cleaning function for standard operation.

Advanced

The Advanced menu contains parameters for Gain control, manually adjustment of speed of sound, offset and restoring the amplifier and transducer to their default state.

These settings typically do not require adjustment unless there are special circumstances. Do not adjust Advanced settings without expert knowledge or consulting your local representation.

Parameter	Description	Options
Gain4	Primary sensitivity adjustment. This value is automatically(1) set by the selected Interface range in Quickset. Higher values for lighter densities.	Adjustable
GainStep3	Adjustment of sensitivity for DistStep3 zone.	Adjustable
DistStep3	Depth of zone measured from the sensor face for non-variable GainStep3.	Adjustable
SlopeInc	Increase or decrease Gain-Over-Distance bias (2)	Adjustable (default 1.5%)
Threshold	Minimum echo size which the unit will accept as a valid echo	Adjustable
EmptyDist	Unit will not consider any echoes beyond this distance valid. This is automatically calculated by the 'Low Level' parameter.	Adjustable
Temp Trim	Create manual measurement offset for a specific temperature.	Adjustable
Dist Trim	Create manual measurement offset for a specific distance.	Adjustable
Velocity	Adjusts the internal speed of sound calculation.	Adjustable

Gain4 default settings

Interface Selected (g/l)	Default Value
0.1 - 0.6	24.9%
0.6-1.2	14.9%
1.2-3.0	10.0%
3.0-6.0	4.9%
6.0-10.0	2.0%
10+	1.1%

Gain-Over-Distance bias

The Sonarflex system uses automatic Gain control to enhance signal tracking during difficult process conditions. Increasing SlopeInc% from 1.5% to 2%-4% will assist the unit to place emphasis on deeper measurement (bed level).
If the unit is locking to a higher interface during sliming or difficult conditions, try increasing this value. Do not exceed 4%. See 'Troubleshooting' for more information.

Relay Actions

Sub-Menu	Description	Options
RlyL1 1-5	Adjust Relay switch point (L1 must be < L2)	Adjustable
RlyL2 1-5	Adjust Relay switch point (L2 must be > L1)	Adjustable

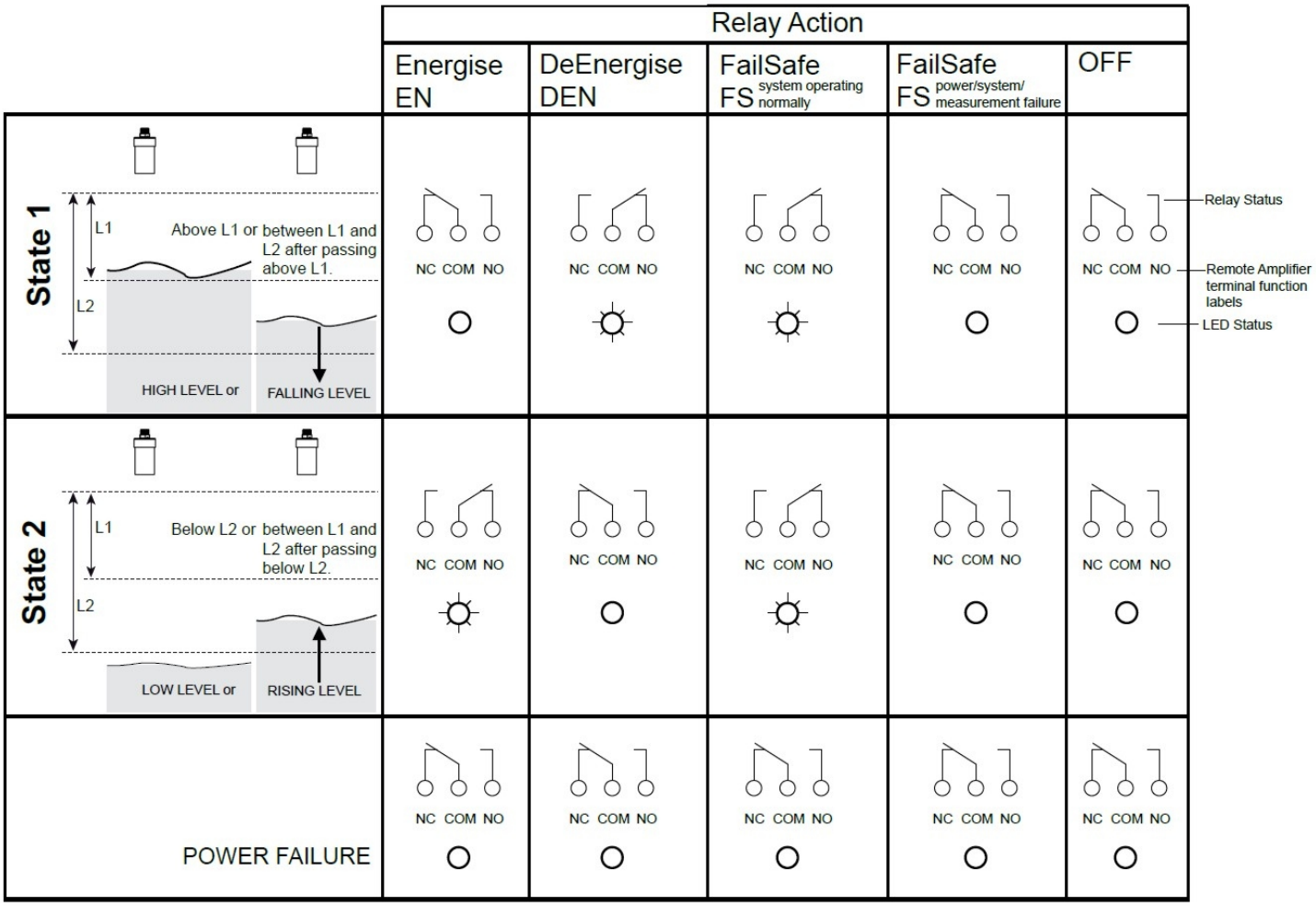
Set Relay Parameters in Output Adjustment menu

The two relay levels are RlyL1 and RlyL2

The display will show RlyL1 1, the last 1 indicated the Relay number (eg 1 to 5)

L1 and L2 distances are measured from the transducer face

L1 must be equal to or less than L2.



Operating State

In this operational state you can use the buttons to navigate through and view unit diagnostics and other measurements.

Diagnostic	Typical Reading	Description
Bed	Distance	Bed indicates Bed height measured from Low Level
Level		Depth indicates depth of measured Density measured from the transducer face
Bed%	%	Height of bed level proportionally based on High & Low level
Tx	1	Address of Transducer (default 1)
Normal	Distance	Unit is operating normally
Recover		Unit is searching for new signal
Failed		Unit is in failsafe mode
W (down)	Distance	Tracking Window end point (measured from sensor face)
W (up)	Distance	Tracking Window start point (measured from sensor face)
T:	23.8	Measured Temperature
N:	0.00%	Noise (electrical and frequency interference)
R:	0.00%	Current Recover Gain added
G:	24.6%	Total amount of Gain applied to track current echo
S:	1.60V	Signal size in Volts
E:	Distance	Non-damped measured distance measured from sensor face down

How to set up the unit - Bed Level + Hindered / settling layer measurement

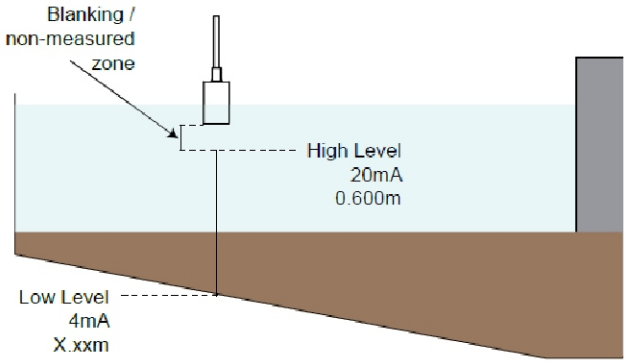
Parameters for standard setups are located in the **'Quickset'** menu.

You will need to program the following parameters:

- App Type - High & Low Level, Density, Bed Depth

- App Type2, High & Low Level2, Density

A) High and **Low Level** should be the same for Both **App Types. High Level** should not be less than 0.600m (2ft).



B) Set **App Type** to **'Bed'** with **Density 10+g/l**. This applies our pre-set parameters to measure the Bed level with the first output.

Set Bed Depth - see Bed Depth(1)

Set **App Type2** to **'Floc'** with **Density 0.6-1.2g/l**. This applies our pre-set parameters to measure the hindered/settling layer to target with Floc Control.

App Type Notes

App Type is the primary measurement. If measuring Bed level it should always be set to Bed level. Density of 10+g/l is the optimum setting to penetrate suspended material to the Bed.

App Type2: Additional Settings

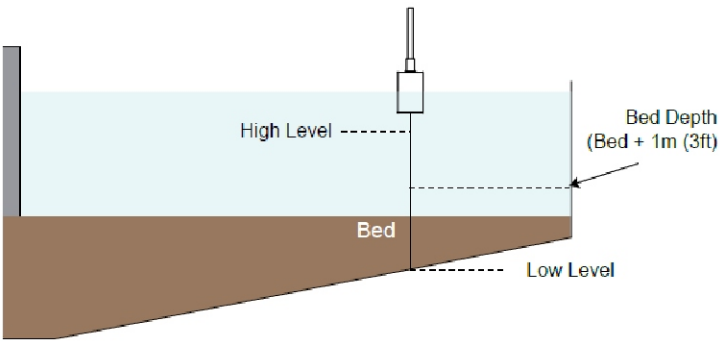
SmplRate - App Type2 is measured at a time based interval. This can be reduced as low as 0.5mins (30 seconds)

Damping2 - Along with reducing **SmplRate** time, Increasing **Damping2** will provide a smoother output trend.

Calibr% - To see a lighter interface increase the **Calibr%** parameter. Use 1% intervals and press **CAL** to fire test pulses. This will return the depth of the measured interface and signal size. Target 1V+ signal at preferred depth. Higher% makes the unit more sensitive to lighter material. Fire several pulses with each adjustment.

Bed Depth

Bed Depth should be programmed to 1m (3ft) higher than the application expected maximum depth



How to set up the unit - Bed Level + Clarity

Parameters for standard setups are located in the **'Quickset'** menu.

You will need to program the following parameters:

- App Type - High & Low Level, Density

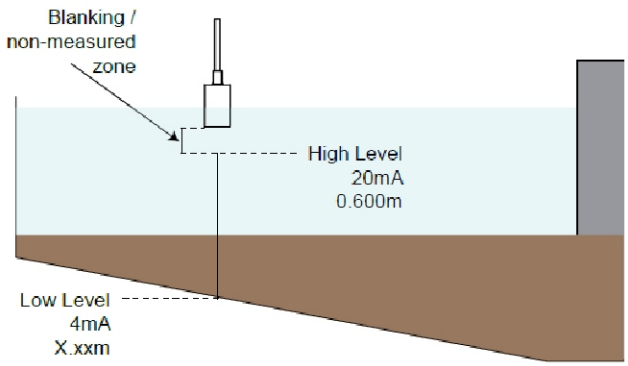
- App Type2, High & Low Level2

A) High Level for **App Type** should not be less than 0.600m (2ft). High and Low level for Clarity is represented as a %. 0% poor Clarity, 100% optimal Clarity.

B) Set **App Type** to **'Bed'** with **Density 10+g/l**. This applies our pre-set parameters to measure the Bed level with the first output.

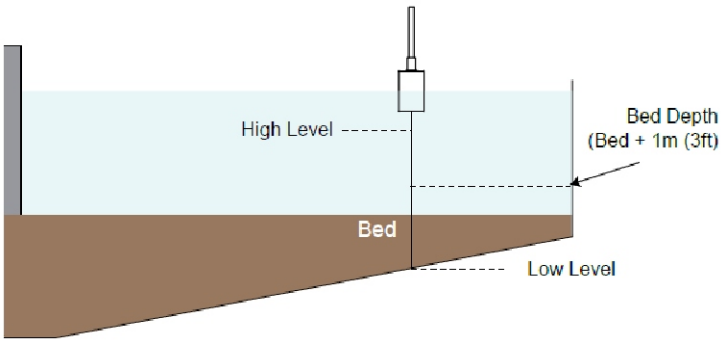
Set Bed Depth - see Bed Depth(1)

Set **App Type2** to **'Clarity'.** This programs output 2 for a proportional 0-100% representation of Clarity.



Bed Depth

Bed Depth should be programmed to 1m (3ft) higher than the application expected maximum depth



How to set up the unit - Hindered Layer + Clarity

Parameters for standard setups are located in the **'Quickset'** menu.

You will need to program the following parameters:

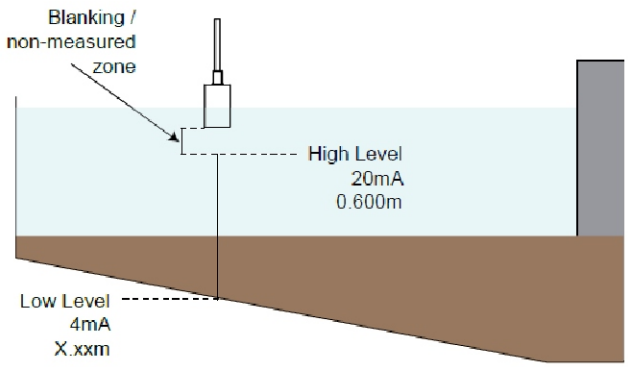
- App Type - High & Low Level, Density

- App Type2, High & Low Level2

A) High Level for **App Type** should not be less than 0.600m (2ft). High and Low level for Clarity is represented as a %. 0% poor Clarity, 100% optimal Clarity.

B) Set **App Type** to **'Floc'** with **Density 0.6-1.2g/l**. This applies our pre-set parameters to measure the Bed level with the first output.

Set **App Type2** to **'Clarity'**. This programs output 2 for a proportional 0-100% representation of Clarity.



Unit is measuring incorrect Bed or Space

• Confirm display mode is correct

• Space is measured from sensor face to target. Bed is measured from low level to target.

• Confirm High Level, Low Level and Bed Depth (if applicable) match application requirement.

• Increase or decrease 'Gain4'. Increasing this value makes the unit more sensitive to interfaces within the tank and vice versa. Programming 'Bed Depth' sets Gain4 to a recommended value based on the expected depth of the Bed level

• The Parameter Slope Inc% (Advanced Menu software rev 5.81) can be used to put more emphasis on deeper measurement - increase this to 3%.

• High volumes of poor settling or suspended material with attenuate the Sonar pulse. The unit may read higher tracking suspended material if process conditions in the tank fail.

PLC indication does not match measurement

• Disconnect the analogue wires from the amplifier. Use a multimeter on the 4-20mA terminals labeled IS and + to read the direct mA from the unit. Reconnected analogue wires and compare this value with the reading from the control system.

• Confirm High Level and Low Level are set to the same values in amplifier and control system.

Unit is measuring incorrect Bed or Space

• Hycontrol is constantly updating and improving the design and accessibility of its products and as a result older units may have different software. Contact your local representation for information on Updating to the latest software.

Error Codes

Error 01:

Amplifier/Transmitter can not communicate with Transducer.

• Wiring: Check the terminals for a loose or incorrect connection (including junction box/cable Extensions)

• Check the cables for any signs of damage

• Ensure any customer supplied cable meets Hycontrol specifications

• If using junction box extension trace the 8-10VDC from the red/black amplifier terminals to the transducer to ensure wires are correct

• If using a junction box ensure you follow Hycontrol's specification for extending cable

• **'Unit Specs & Checks'** has additional checks for causes of Error 01.

Error 02:

Communication data corruption between Transmitter and Transducer.

• It can be a result of noise in data lines or one of data lines (white or blue) being open circuit.

• Make sure wiring is correct especially look to the screen (earth).

• Ensure you are using quality shielded instrument cable.

• **'Unit Specs & Checks'** has additional checks for causes of Error 02.

Error 03:

• Specific comms mode is selected (eg Profibus, FF) but comms module is not connected or responding

• Check your unit part number to ensure it has correct comms

• If you do not have additional comms (part number option X) then select Modbus.

Error 04:

Amplifier is programmed with incorrect software or has wrong hardware connected.

• Contact your local support.

ActuatorErr

Before the Actuator sweeps the Sonarflex will check the incoming voltage to confirm it is not less than the **VoltCutOff** parameter value. If it does detect the error it will display **ActuatorErr** for a few seconds on the LCD. Confirm 24VDC power supply is per spec (min 5A at the terminal)

ActuatorVsErr

If the voltage drops below the **VoltCutOff** parameter value during an attempted Actuator swing the Sonarflex will display **ActuatorVsErr** for a few seconds on the LCD. Confirm 24VDC power supply is per spec (min 5A at the terminal).